SCIENCE AND TECHNOLOGY

TEACHING THEME

DESIGNING AND CONSTRUCTING A BRIDGE

OVERALL SCIENCE AND TECHNOLOGY EXPECTATIONS

- **Design and construct a variety of structures, and investigate the relationship between the design and function of these structures and the forces that act on them;**
- **Demonstrate an understanding of the relationship between structural forms and the forces that act on and within them.**

MR. “T” – Grade 7

INTRODUCTION

Bridges are structures used by people and vehicles to make crossing areas easier in travel. Engineers build bridges over rivers, lakes, ravines, canyons, railroads, and highways. Bridges must be built strong enough to safely support their own weight as well as the weight of the people and vehicles that pass over them. They must additionally be able to withstand natural occurrences that include weathering, earthquakes, strong winds, freezing and thawing. This assignment will provide students with an opportunity to design and create their own bridge.

THE ASSIGNMENT

Design and create a bridge that is 80 cm long, 10 cm wide and able to support a minimum load of 10 Kilograms. Your bridge would need to have a design that would be suitable for crossing a deep canyon.

TOOLS AND MATERIALS

- Wooden square sticks 8mm x 8mm
- Bristol Board OR Thin Cardboard (optional)
- Hot Glue Gun
- Scissors
- Hack saw
- Miter Box
- String (optional)

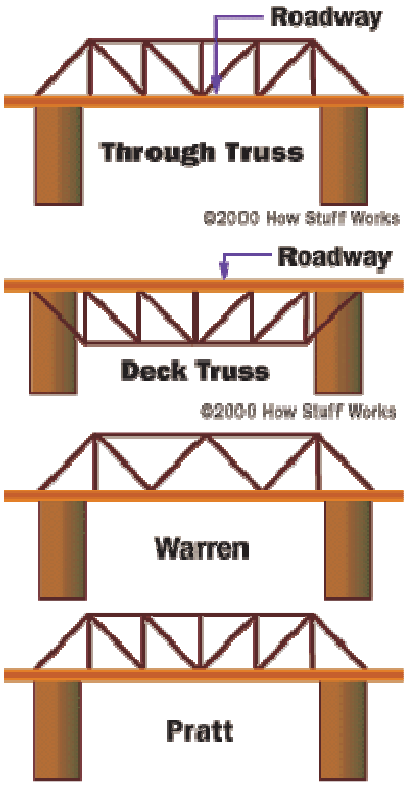
SAFETY

- Safe use of cutting tools i.e. hacksaw and scissors
- Safe use of hot glue guns
- Consistent use of safety glasses

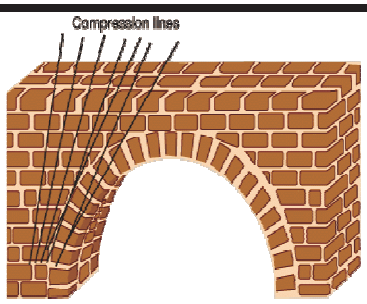
Types of Beam Bridges

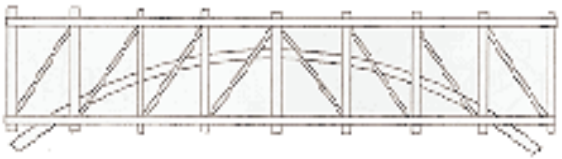
Beam bridges come in dozens of different styles. The design, location and composition of the truss is what determines the type. In the beginning of the Industrial Revolution, beam-bridge construction in the United States was developing rapidly. Designers were coming up with many different truss designs and compositions. Wooden bridges were being replaced by all-iron or wood-and-iron combinations. The different truss patterns also made great strides during this period. One of the most popular early designs was the **Howe truss**, a design patented by William Howe in 1840.

His innovation came not in the pattern of his truss, which was similar to the already existing Kingpost pattern, but in the use of vertical iron supports in addition to diagonal wooden supports. Many beam bridges today still use the Howe pattern in their truss.

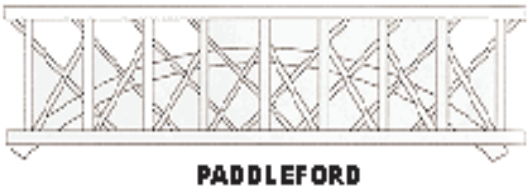



Motion Pictures Photography

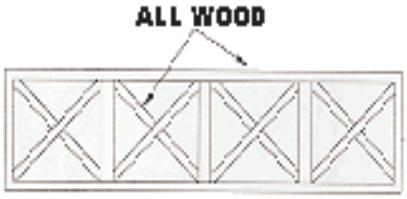

Compression lines



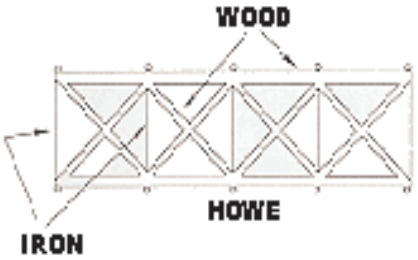
BURR (KINGPOST ARCH)



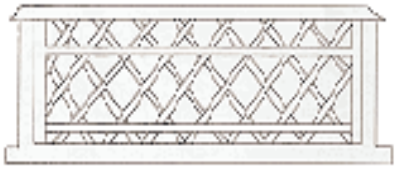
PADDLEFORD



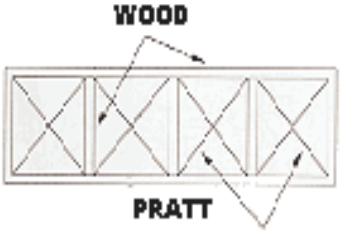
LONG



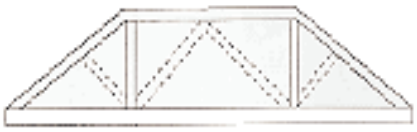
HOWE



TOWN LATTICE



PRATT



QUEENPOST

KINGPOST

CORNER CONSTRUCTION

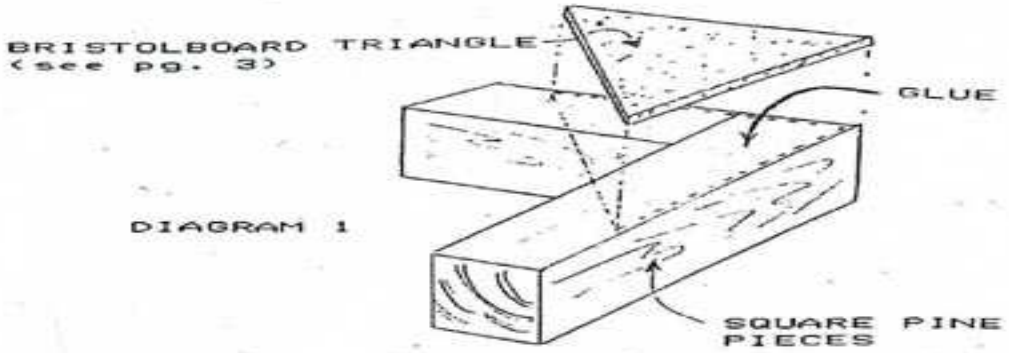


DIAGRAM 1

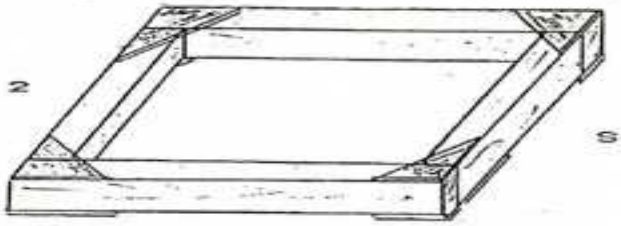


DIAGRAM 2

SQUARE

WOODEN STRUCTURES

CORNER DETAIL

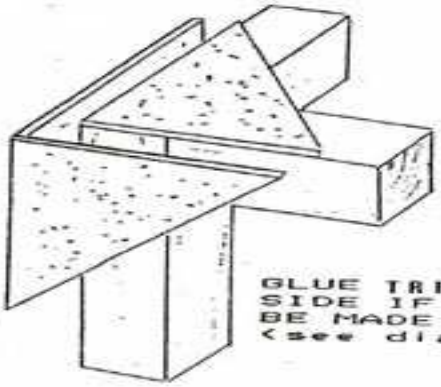
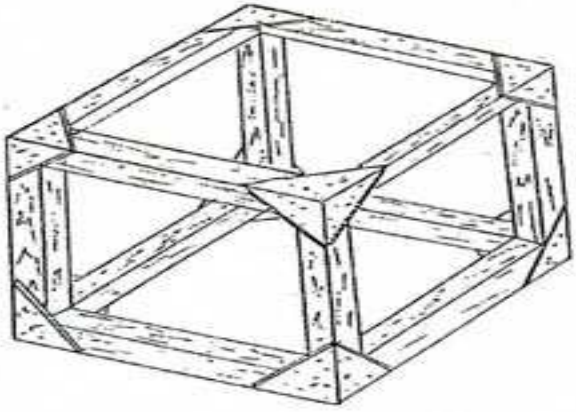


DIAGRAM 3

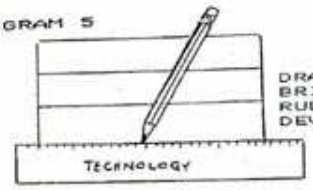
GLUE TRIANGLE TO ONE SIDE IF FRAME IS TO BE MADE THREE DIMENSIC (see diag. 2)



SAMPLE CUBE

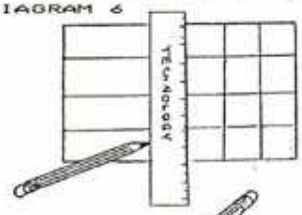
DIAGRAM 4

DIAGRAM 5



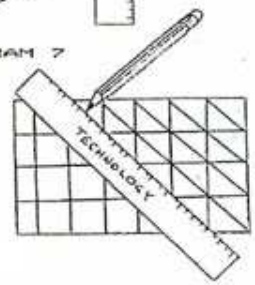
DRAW HORIZONTAL LINES BRISTOLBOARD (USE WIDE RULER OR OTHER APPROP DEVICE)

DIAGRAM 6



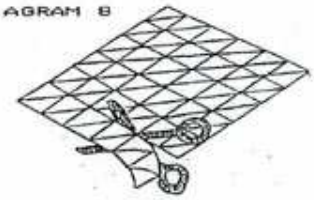
DRAW VERTICAL LINES

DIAGRAM 7



DRAW DIAGONALS TRIANGLES

DIAGRAM 8



CUT STRIPS AS NEEDED

The "Perfect" SquareTemplate

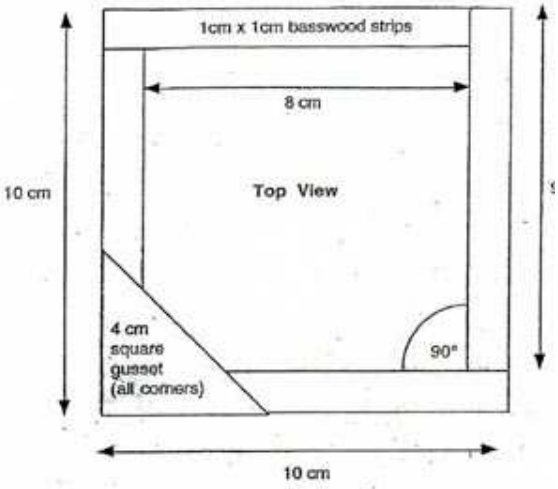
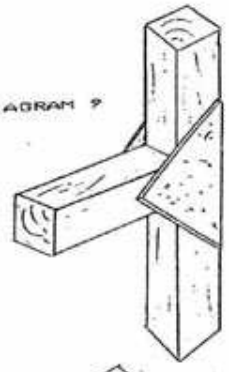
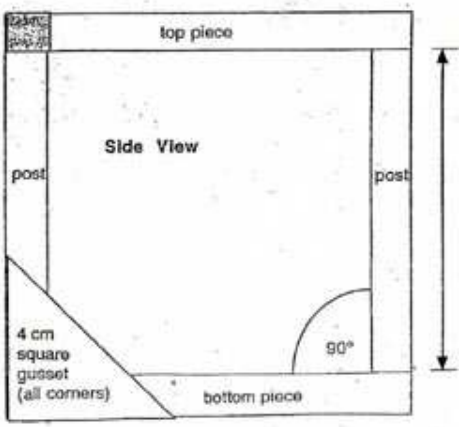


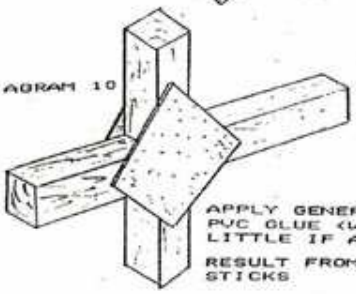
DIAGRAM 9



TEE JOINT



IAGRAM 10



APPLY GENEROUS AMOUNT OF PVC GLUE (WHITE) TO TRIANGLE LITTLE IF ANY STRENGTH WILL RESULT FROM GLUING BETWEEN STICKS